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ABSTRACT

The study involving 65 school psychologists, 38 special education teachers, and 21 "naive" university students (those not in education or psychology related programs) examined the extent to which school personnel were able to differentiate learning disabled (LD) students from low achievers by examining students' patterns of scores on psychometric measures. Each S was provided with forms containing information on 41 test or subtest scores of 9 school identified LD and 9 nonLD fourth grade students and was instructed to indicate which he/she believed were LD and which were nonLD. Accuracy and interjudge agreement confirmed the difficulty of differentially diagnosing students with learning disabilities and suggested that having information from a battery of tests does not increase the decision maker's ability to discriminate between LD and nonLD students. It was recommended that current assessment practices be simplified. (Author/SB)

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Susan Epps, James E. Ysseldyke, and Matthew McGue

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March, 1981

Abstract

This study examined the extent to which school personnel were able to differentiate learning disabled students from low achievers by examining students' patterns of scores on psychometric measures. Subjects were 65 school psychologists, 38 special education teachers, and a "naive" group of 21 university students in programs unrelated to education or psychology. Each judge was provided with forms containing information on 41 test or subtest scores of 9 school-identified LD students and 9 non-LD students and instructed to indicate which he/she believed were learning disabled and which were non-learning disabled. Accuracy and inter-judge agreement confirmed the difficulty of differentially diagnosing students with learning disabilities and suggested that having information from a battery of tests does not increase the decision maker's ability to discriminate between LD and non-LD students. Considering the extreme difficulty in integrating empirical and non-empirical information, it is recommended that current assessment practices be simplified.

Differentiating LD and Non-LD Students

"I Know One When I See One"

Learning disabilities researchers typically have attempted to identify the salient characteristics that distinguish LD students from other students, especially those identified as "educable mentally retarded," "emotionally disturbed," or "normal" (Ackerman, Peters, & Dykman, 1971; Bussell, Huls, & Long, 1975; Gajar, 1979; Wagonseller, 1973; Webster & Schenck, 1978). A major difficulty with such studies is that they compare learning disabled students to populations with obviously different characteristics. In comparison to the mentally retarded, intellectual differences are expected and observed; compared to students classified as emotionally disturbed, differences in the number of behavior problems are expected and observed; in comparison to "normal" students, differences in the level of academic achievement are expected and observed. Such investigations provide little new or useful information.

Difficulties typically arise when diagnostic personnel attempt to differentiate LD students from those who are simply slow learners. These students are ones who fail to acquire academic skills and fail to meet the objectives that the school sets for them. A critical diagnostic problem is seen in efforts to decide, from among the population of students who are not "making it" in school, who should be declared LD and provided with special educational interventions. Research is nearly nonexistent on this critical diagnostic problem.

Ysseldyke, Algozzine, Shinn, and McGue (in press) found a relatively

large number of fourth-grade students who were low achieving but not labeled as LD, despite the fact that school personnel believed that few such students existed in their schools. The students scored in the lowest quartile on a group achievement test, but had not been identified as LD by their school districts.

Given that the two groups of students (low achievers and LD) do exist, it becomes important to investigate the basis for distinguishing them. Ysseldyke et al. (in press) examined the extent to which measures of cognitive ability, academic achievement, perceptual-motor skills, self-concept, and behavior problems discriminated between low achievers and school-identified LD children. Their results indicated considerable similarities between the two groups; an average of 96% of their scores were within a common range and the performance of the LD and low-achieving students on many of the subtests was identical. Based on individual psychometric measures, Ysseldyke et al. raised serious concerns regarding the differential classification of low-achieving students as either learning disabled or non-learning disabled.

Some school personnel have argued, however, that decisions actually are made on the basis of the pattern of scores that students obtain on several different psychometric instruments. It thus becomes important to ascertain the extent to which school decision makers can distinguish between the two groups when given patterns of scores on multiple measures.

The use of a number of scores to identify learning disabled students is, in fact, mandated by the U.S. Office of Education. The August 23,

1977 Federal Register specifically states that "no single procedure is used as the sole criterion for determining an appropriate educational program for a child" (p. 42497). To determine the existence of a specific learning disability, "a severe discrepancy between achievement and intellectual ability" (Federal Register, 1976, p. 65083) must be demonstrated. Both of these federal guidelines necessitate the use of more than one test in an evaluation of a student, a procedure which, in turn, requires an examination of a student's pattern of scores.

Although an ability-achievement discrepancy is a typical requirement for classification as learning disabled, by no means is there consensus that it is a useful concept. Salvia and Ysseldyke (1981) caution that before a student's difference scores can be interpreted, it must be established that the differences are reliable; differences in standardization samples for the two tests also should be considered. In practice, these cautions frequently are ignored. In addition, a number of studies (Algozzine, Forgnone, Mercer, & Trifiletti, 1979; Algozzine, Ysseldyke, & Shinn, 1980; Ysseldyke & Algozzine, 1979) argue that learning disabilities is largely a category of underachievement, thus suggesting that the degree of students' achievement deficits also should be considered when determining eligibility for LD placement.

To investigate the extent to which judges could differentiate between non LD students and those who are learning disabled, Epps, McGue, and Ysseldyke (1981) presented 18 judges with an array of test information similar to that typically presented in placement team meetings and asked them to determine which of 99 students were LD and which were not. The judges were individuals who had previous experience in psychoeducational assessment

and/or placement team decision making, plus experience in research on learning disabilities. Epps et al. (1981) found that the judges were extremely inaccurate and rarely in agreement with each other. The judges also emphasized different factors in making their decisions. As Epps et al. noted, however, the judges were not working within the educational system and were not making day-to-day decisions about the classification of students. To overcome this limitation, the present study was designed so that actual decision makers in the field could attempt to use patterns in the data to differentiate LD and non-LD students. In addition, a comparison group of individuals unfamiliar with psychoeducational decision making was included to provide baseline accuracy information.

Method

Subjects

The sample consisted of 65 school psychologists, 38 special education teachers (SLD or SLBP), and 21 university students in programs unrelated to education or psychology (the "naive" group). The school psychologists were randomly selected from the 1979 NASP Directory. Since there is no comparable national directory for special education teachers, their participation was solicited in two ways. First, the names of 175 elementary schools were randomly selected from a directory of U.S. schools. The packet of materials was sent to the "LD Teacher" at each of these schools. Second, the name of one director of special education was randomly selected from each state and from the District of Columbia. Each director was sent two packets of materials and requested to give them to "any two SLD/SLBP teachers from [his/her]

district who would be willing to provide input for our LD/Non-LD classification study." Both the names of the elementary schools and the special education directors were obtained from the School Universe Data Book, School Year 1976-1977.

Altogether, a total of 306 forms was sent out to school psychologists; 277 were sent out to elementary schools or to special education directors for the special education teachers. For participating in the study, each subject had the opportunity to earn a cash prize of $25, $15, or $10. The relatively low response rates for school psychologists and teachers (21.2% and 13.7%, respectively) seemed to be due in part to the difficulty in reaching the individuals (incorrect addresses, etc.) and to the time-consuming nature of the task.

The participation of the naive group was solicited from two undergraduate courses, one in mechanical engineering and one in business management. The main criterion for their inclusion in the study was that they were inexperienced in psychoeducational assessment; that is, they had not taken education courses nor any psychology classes beyond introductory psychology. For participation in the study, each subject earned $5.

Materials

Forms containing the chronological age and sex of 18 fourth-graders and information on their actual test scores in five domains were prepared. These domains and the tests used were: (a) aptitude (WISC-R, Woodcock-Johnson Tests of Cognitive Ability, (b) academic achievement (Woodcock-Johnson Tests of AChievement, PIAT, Stanford Achievement Test - math calculation and math concepts), (c) perceptual-motor

(Bender, VMI), (d) self-concept (Piers-Harris), and (e) behavior problems (Peterson-Quay). Across these five domains, test scores were provided on 41 variables.

Based upon the school classification and low-achievement criteria, the 18 cases were selected from a larger study that compared the test performance of 50 school-identified LD students to that of 49 low-achieving students who had not been identified as learning disabled. Nine of the 18 cases were school-identified LD students and nine were low achievers from metropolitan Minneapolis and St. Paul schools. Only eight of the low achievers were included in the analysis.[1] The LD/non-LD classification was not indicated on the judges' test score forms. The exact criteria for identification of students as LD by the schools were unknown. The low-achieving group had not been identified as LD by their school districts, but scored at or below the 25th percentile on the Iowa Tests of Basic Skills which had been administered by the schools during the fall of the school year.

As a criterion for considering a student LD, the degree of students' achievement deficits was taken into account and contributed to the case selection procedure. The achievement deficits were operationalized in two ways using subjects' observed test scores in written expression, basic reading skill, reading comprehension, mathematics calculation, and mathematics reasoning. In one condition (1.0 SD), the student was considered LD by definition if the score earned on at least one of the criterion measures was between 1.0 and 1.5 standard deviations below the mean (standard scores of 78 to 85). In the

other condition (1.5 SD), the student was considered LD if the score earned was at least 1.5 standard deviations below the mean (standard scores of 77 or below). Tables were developed listing school-identified LD students and low achievers who met the criterion of LD or non-LD according to the low achievement definition. Cases were then randomly selected from the categories, resulting in the numbers presented in Table 1.

Insert Table 1 about here

Along with the schools' classification and the two operationalizations of the low achievement definition, the federal definition of learning disabilities, taken from the December 29, 1977 Federal Register, was used to classify students as LD or non-LD. That definition lists seven areas in which a child may be determined to have a specific learning disability: oral expression, basic reading skill, reading comprehension, mathematics calculation, mathematics reasoning, listening comprehension, and written expression. However, the federal definition does not specify the amount of discrepancy between ability and achievement that is required. In the present study, the federal definition was operationalized in two ways using subjects' observed aptitude-achievement test scores in the areas of intelligence and achievement. The following measures were used to ascertain discrepancy in the seven areas: (a) written expression (WISC-R Full - W-J Written Language Achievement), (b) basic reading skill (WISC-R Full - W-J Reading Achievement), (c) reading comprehension (WISC-R Full - PIAT Reading Comprehension), (d) mathematics calculation (WISC-R Full - Stanford Mathematics Calculation), and (e) mathematics reasoning (WISC-R

Concepts). In one condition (1.0 SD), the student was considered LD by definition if there was between a 1.0 and 1.5 standard deviation difference on at least one of the five aptitude-achievement discrepancy scores (difference scores of 15 to 22). In the other condition (1.5 SD), the student was considered LD if there was at least a 1.5 standard deviation difference on at least one of the five aptitude-achievement discrepancy scores (difference scores of 23 or more). Table 2 indicates the number of cases of school-identified LD students and low achievers who were classified as LD and non-LD based on the school's definition and the federal definition.

Insert Table 2 about here

Along with the "test scores" form, the packet of materials given to judges included a "tests administered" form that specified which tests were used in each of the five areas. A third sheet provided normative data on those measures that did not have a mean of 100 and standard deviation of 15. These included the Bender Visual-Motor Gestalt Test, the Developmental Test of Visual-Motor Integration, and the Peterson-Quay Behavior Problem Checklist. Also provided were a full group mean and standard deviation for the Piers-Harris Children's Self-Concept Scale, based upon the larger sample of 99 students. (See the Appendix for copies of all materials provided to judges.)

Procedure

Each judge received the packet of materials and a response form and then was instructed to examine the test scores for the 17 students and to indicate which he/she believed were learning disabled and which

were non-learning disabled. After a decision had been made regarding each child's classification, the judge indicated his/her degree of certainty on a four-point scale from very uncertain to very certain. Then each judge rated the extent to which different factors affected his/her decisions.

Results

Judges' Accuracy

Judges' accuracy in identifying the non-LD and school-identified learning disabled students is reported in Table 3. A comparison was made between judges' ratings and school classification, between judges' ratings and the classifications from each of the two levels of achievement deficit, and between judges' ratings and the classifications from each of the two federal definitions. The accuracy percentages were computed separately for LD and non-LD students within each of the five conditions and F values were calculated. All three groups of judges were in agreement with the schools' classifications only about half of the time and there was no significant difference between the teachers, the school psychologists, and the naive group in their overall agreement with the schools [$F(2,121) = .44$, $p = .64$].

When the 1.0 SD achievement deficit was considered, whereby a student was classified as LD if the score earned on at least one of the criterion measures was between 78 and 85, again there was no significant difference between the three groups in their overall accuracy [$F(2,121) = .85$, $p = .43$]. However, when the 1.5 achievement deficit was considered, whereby a student was classified as LD if the score earned on at least one of the criterion measures was 77 or below, there was a significant difference [$F(2,121) = 18.29$,

$p < .000$]. The naive group was more accurate in identifying those students who had scores of 77 or below (73.1%) than were either the teachers (54.7%) or the school psychologists (56.5%).

Insert Table 3 about here

Although the naive group was more accurate in identifying those students who were classified as LD based upon the 1.5 SD low achievement definition, they were less accurate (26.3%) in identifying those students who had a moderate aptitude-achievement discrepancy (1.0 SD federal definition) then were either the teachers (43.7%) or the school psychologists (42.4%). The naive group was also less accurate (35.0%) in identifying those students who had a severe aptitude-achievement discrepancy (1.5 SD federal definition) than were either the teachers (53.6%) or the school psychologists (53.6%). However, the teachers and school psychologists were in agreement with the two operationalizations of the federal definition for only about half of the students.

Judges' Leniency

The second factor that was examined was leniency, which reflects the percentage of children classified as LD. By definition, a lenient judge classifies more students as LD than as non-LD. A non-lenient judge classifies fewer students as LD than as non-LD. As can be seen in Table 4, the overall leniency of the three groups did not differ significantly [$F(2,121) = 1.2$, $p = .32$]. In other words, teachers (39.1%), school psychologists (35.6%), and the naive group (32.5%) identified an approximately equal proportion of the students as LD. Overall, the three groups were less lenient in their classifications than

were the schools and identified fewer students as LD than the 50% which the schools had so identified.

Insert Table 4 about here

As can be seen in Table 4, students 1, 12, and 17 met the criteria for LD based upon the school definition and the two low achievement definitions. Yet, for student 1, only 26.3% of the teachers and 18.5% of the school psychologists identified him as LD. In contrast, 85.7% of the naive group did so. Despite the fact that 73.7% of the teachers and 81.5% of the school psychologists incorrectly classified the student, regardless of which definition was used as a criterion, as a group each was certain of its decision (average degree of uncertainty: 2.97 for teachers and 3.05 for school psychologists on a scale where 2 = uncertain and 3 = certain). For student 12, greater percentages of teachers (44.7%) and of school psychologists (58.5%) identified him as LD than for student 1. Still a significantly greater percentage of the naive group identified him as LD (90.5%).

Students 5, 6, 10, 14, and 17 met the criteria for LD based upon the school definition and the two federal definitions. For three of these four students (6, 10, and 14), significantly greater percentages of teachers and school psychologists identified them as LD than did the naive group. For student 5, however, there was no significant difference in the percentages of judges classifying him as LD.

There was only one student (student 17) who met the criteria for LD based upon all five conditions, namely, the school definition, the

two low achievement definitions, and the two federal definitions. For student 17, a greater percentage of the naive group (81.0%) identified him as LD than did the teachers (63.2%) or school psychologists (64.6%), although this difference was not significant. Despite the fact that this student was classified as LD based upon all five definitions, a considerable percentage of teachers (36.8%) and school psychologists (35.4%) classified him as non-LD. In general, for all three students (1, 12, and 17) who met the criteria for definition as LD under the school and low achievement definitions, a greater percentage of the naive group identified the students as LD than did the teachers or school psychologists. The reverse was true when the school and federal definitions were considered. For three of these four students (6, 10, and 14), greater percentages of the teachers and school psychologists identified the students as LD than did the naive group.

Table 4 also provides information on two students (8 and 13) who did not meet the criteria for the school definition or for the two low achievement definitions of LD. That is, the schools did not classify them as LD nor were any of their scores on standardized tests 85 or below. Yet, a fourth of the teachers (26.3%) and 13.8% of the school psychologists, along with 38.1% of the naive group, classified student 8 as LD. Similarly, a substantial number of teachers (18.4%) and school psychologists(12.3%), along with 14.3% of the naive group, also classified student 13 as LD. Another student (student 11) did not meet the criteria for the school definition or for the two federal definitions of LD. That is, the schools did not classify him as LD nor were any of

his ability-achievement discrepancy scores as great as 15 points. Yet 34.2% of the teachers and 23.4% of the school psychologists, along with 66.7% of the naive group, classified student 11 as LD.

Intergroup Agreement

The third factor that was investigated was intergroup agreement, the extent to which judges of one group agreed with judges of another group in their ratings of the students. For each of the three experimental groups, teachers, school psychologists, and naive, the proportion of group members who classified each of the 17 cases as LD was determined. The 17 proportions represent the extent to which teachers, for example, in general, identified each of the students as being learning disabled. In deriving the index, the point biserial correlation between each judge's ratings and the three group composites was then calculated as a measure of the extent to which each judge agreed with teachers, school psychologists, and naive.

Considering that the naive group had no training in psychoeducational decision making, we would expect them to be in low agreement with school personnel. As can be seen in Table 5, the naive group was in low agreement with both the teachers' composite group decisions (.04) and the school psychologists' composite group decisions (.08). For professionals trained in this decision-making process, we would expect to find high agreement. Teachers were found to agree as much with the school psychologists' composite (.50) as with their own (.49). Similarly, school psychologists agreed as much with the teachers' composite (.47) as with their own (.53). Thus, high agreement was observed between the two professional groups.

Insert Table 5 about here

Factors Influencing Decisions

The fourth factor that was examined was the degree to which certain factors influenced judges' decisions. Each judge rated the effect that the factors had on her/his decisions. As can be seen in Table 6, there was a high degree of similarity in the ratings across the three groups. There were no significant differences between the three groups on the rated importance of intellectual measures, measures of academic achievement, perceptual-motor tests, adaptive behavior, personality test data, and behavioral recordings. Both teachers and school psychologists rated intellectual factors, academic achievement, and discrepancies between expected and actual achievement very highly (range of ratings: 4.2 to 4.4). In contrast, the child's sex and personality were rated as low in importance.

Insert Table 6 about here

In their ratings of the importance of various factors on their decisions, judges were likely to have been guided by their knowledge of the definitions for learning disabilities. Thus, their ratings might reflect more of what they believe were important factors than of what factors actually were important in their decision-making process. To examine the variables that the three groups of judges actually used to classify the students, mean difference scores were examined. For each group, the means of each of the 41 original test scores were calculated for students whom the judges in the group classified as LD and for students

whom they classified as non-LD. In addition, the means for five discrepancy scores (WISC-R Verbal - WISC-R Performance, W-J Reading Aptitude - W-J Reading Achievement, W-J Mathematics Aptitude - W-J Mathematics Achievement, W-J Written Language Aptitude - W-J Written Language Achievement, and WISC-R Full - PIAT Total) were calculated. The 46 absolute mean differences were determined and then rank ordered from largest to smallest. For example, for a group of judges, the variable ranked first would be that variable for which the students judged learning disabled were most different from the students judged non-learning disabled. Thus, that variable apparently played a major role in the differentiation of LD from non-LD for that group of judges, although not necessarily for each judge within that group. For each group of judges, the 11 highest-ranked variables are presented in Table 7.

Insert Table 7 about here

As can be seen in Table 7, there is a considerable overlap in the variables for teachers and school psychologists. Of the 11 variables listed, 9 are common to both. In addition, there is overlap in the variables for the naive group as compared with the teachers and school psychologists. Of the 11 variables listed for this group, 4 of them are common to those of both the teachers and school psychologists and another 2 are common to those of the school psychologists. At the group level of analysis, average mean difference scores suggest that both teachers and school psychologists primarily examined achievement measures with less emphasis given to cognitive measures, aptitude-achievement discrepancy, and school-related aptitude measures. In

contrast, the naive group apparently gave greater consideration to individual subtests. Although the teachers gave a high rating to the degree to which intellectual measures influenced their decisions (rating of 4.3), the mean difference in IQ between the group of students they identified as non-LD versus those identified as LD was only 1/2 a point. Similarly, the school psychologists gave a high rating to intellectual measures (4.2), yet the mean difference in IQ between the two groups was only one point. However, for the naive group, who rated intellectual measures at 3.9, the mean difference in IQ between the two groups was 13.1 points with the non-LD group scoring higher.

Discussion

There is little doubt that the identification of students with learning disabilities is fraught with difficulties. Not only are there no meaningful psychometric differences between students identified by schools as learning disabled and those who are performing poorly in school and not identified as LD (Eno & Woehlke, 1980; Ysseldyke et al., in press), but judges experienced in psychoeducational assessment, although not working within the educational system, also were unable to identify accurately the LD students when presented with their patterns of scores on numerous devices (Epps et al., 1981). The results of the present study confirm the difficulty of differentially diagnosing students with learning disabilities, even when actual school decision makers are the judges, and suggest that having access to information from a battery of tests does not increase the decision maker's ability to discriminate between LD and non-LD students. Despite the fact that there was high intergroup agreement between teachers and school

psychologists and low intergroup agreement between the naive group and school personnel, all three groups still identified approximately the same number of students as LD. And despite the fact that the naive group was the only group having no specific training in psychoeducational decision making, they were significantly more accurate in identifying those students classified as LD using the 1.5 standard deviation low achievement definition. For the student who met the criteria for definition as LD under all five definitions, a greater percentage of the naive group identified him as LD than did either the teachers or school psychologists. In addition, although two of the students were classified as non-LD in four of the five conditions, a substantial number of both teachers and school psychologists classified them as LD.

The difficulty in discriminating the LD from the non-LD students is likely to have been influenced by a number of factors. First, test results were presented in standard scores with a mean of 100 and standard deviation of 15. Such a format may have been confusing for those teachers who are more accustomed to grade and age equivalents and for those school psychologists who are more accustomed to WISC-R scaled scores with a mean of 10 and standard deviation of 3. Second, some of the judges may have been unfamiliar with the tests and their school systems may have employed a different battery of tests. Third, a lack of consistent agreement among school personnel reflects, in part, the varying state guidelines for LD identification. Fourth, other types of information, beyond psychometric data, may contribute to LD identification and classification decisions. Indeed, it is desirable to have direct observational data on the student's behavior and actual classroom work and information from criterion-referenced tests. The format of this

study necessitated a test-centered approach to diagnosis which precluded consideration of qualitative information. Fifth, classification decisions are, in fact, not made by one person. Indeed, the August 23, 1977 Federal Register states that each public agency shall "insure that the placement decision is made by a group of persons" (p. 42497). And sixth, there are certain external constraints that frequently are considered in classification decisions (e.g., the availability of an LD program in the student's school).

Federal guidelines mandate the use of more than one test in an evaluation of a student and thus require an examination of a student's pattern of scores. Consequently, school decision makers must evaluate a multitude of empirical information as well as non-empirical criteria. They must decide what data are relevant and valid and then weigh the importance of various pieces of data and combine or organize them in some manner. This approach to evaluation using multiple sources of information is nonproblematic if we assume that individuals are capable of conducting such complex tasks. However, a number of studies have consistently demonstrated that we are far less capable of making complex judgments than we typically believe. For example, Oskamp (1965) demonstrated the low accuracy of judgments of trained psychologists when presented with a complex judgment task. As the psychologists gained further information about the case, they became increasingly confident in their decisions, although their average final accuracy never exceeded 28%. Indeed, increasing feelings of confidence as more information is gathered is not a sure sign of increasing accuracy in the decision.

Why we experience difficulty in making complex judgments, such

as identifying LD students, is uncertain. First, it may be in part due to the insufficient and inaccurate feedback that we often receive about our judgments. In other words, there is wide disagreement about what constitutes the category of learning disabilities and no specific external criterion with which we can check our decisions. Second, individuals frequently do not adhere to certain basic normative rules when forming judgments. For example, they may fail to consider the technical adequacy of various psychoeducational devices or the appropriateness of using various tests with certain populations. And third, poor judgments may be caused by "cognitive overload." In many cases, information becomes too complex for us to process optimally. In attempting to use simplifying judgment strategies, we are likely to ignore much information and often will integrate other information inaccurately. The human tendency to simplify complex tasks appears to be most commonly expressed by using new information to confirm an existing hypothesis rather than disregarding the new information (Jason, 1978). Thus, in the present study, the decision makers were likely to have evaluated the extensive array of data in terms of its contribution to their initial hypothesis of a student's classification.

When psychoeducational decisions are impaired by bias in assessment or failure to consider certain normative principles, training specifically aimed at remediating these problems may improve decision making. However, when decisions are impaired by cognitive overload, corrective training may provide little or no improvement.

Considerable time and expense are expended by school personnel to determine the classification of students referred for evaluation. This

process of evaluation typically involves the use of numerous psycho-educational devices which frequently requires the services of several diagnostic personnel. Considering the extreme difficulty in integrating the multitude of empirical and non-empirical information, and given the fact that there are no meaningful psychometric differences between school identified LD students and low achievers who are not identified as LD, a change is necessary in current assessment practices. Such a modification would desirably simplify the evaluation process so that fewer tests are used. In addition, the placement of a student in an educational setting might be determined more profitably by examining his/her present repertoire of behaviors rather than by collecting a multitude of test scores and then placing the student according to the diagnostic label (Deno & Mirkin, 1977; Hallahan & Kauffman, 1977; Neisworth & Greer, 1975).

Given current definitions of the category of "learning disabilities" and the extreme heterogeneity of the population of students considered learning disabled, there is little basis for the hope that school personnel are going to be able to diagnose LD students reliably. Indeed, the educational utility of the category of "learning disabilities" is suspect.

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Footnote

[1]One of the low achievers was deleted from the study due to typographical errors that were detected in several subtest scores after materials had been mailed to teachers and school psychologists.

Table 1

Number of Students Within Categories of School and Low Achievement Definitions of Learning Disabilities

Low Achievement Definition[a]		School Definition	
		LD	Non-LD
Non-LD	(86 or above)	3	2
1.0 SD LD	(78 to 85)	3	3
1.5 SD LD	(77 or below)	3	3

[a]Numbers in parentheses indicate the achievement deficit scores (in standard score units: $\bar{X}$ = 100, SD = 15) required for each operationalization of the low achievement definition.

Table 2

Number of Students Within Categories of School and Federal Definitions of Learning Disabilities

Federal Definition[a]		School Definition	
		LD	Non-LD
Non-LD	(1-14)	1	1
1.0 SD LD	(15-22)	3	2
1.5 SD LD	(23 or more)	5	5

[a]Numbers in parentheses indicate the ability-achievement discrepancy scores required for each operationalization of the federal definition.

Table 3

Judges' Accuracy in Identifying LD and Non-LD Students

According to Five Definitions

	Teachers	Sch. Psyc.	Naive	F(2,121)	p
School Definition					
% Correct LD	42.8	41.4	38.1	.39	.68
% Correct Non-LD	65.1	70.1	73.8	1.76	.18
% Overall Accuracy	53.3	55.2	54.9	.44	.64
1.0 SD Achievement Deficit					
% Correct LD	45.6	43.2	38.5	1.08	.34
% Correct Non-LD	76.7	82.5	81.9	.93	.40
% Overall Accuracy	54.7	54.8	51.3	.85	.43
1.5 SD Achievement Deficit					
% Correct LD	41.2	38.9	57.9	5.79	.004
% Correct Non-LD	62.1	66.1	81.4	7.68	.0007
% Overall Accuracy	54.7	56.5	73.1	18.29	.0000
1.0 SD Federal Definition					
% Correct LD	40.3	37.6	26.7	4.39	.014
% Correct Non-LD	69.7	79.2	23.8	19.80	.000
% Overall Accuracy	43.7	42.4	26.3	10.43	.0001
1.5 SD Federal Definition					
% Correct LD	43.8	40.8	22.4	8.57	.0003
% Correct Non-LD	67.7	71.8	53.1	8.24	.0004
% Overall Accuracy	53.6	53.6	35.0	24.85	.0000

Table 4

Percentages of Judges Classifying Student as LD (Leniency)

	Student Classification[a]						
	Low Ach	Federal	Teachers	Sch. Psyc.	Naive	χ^2(df=2)	p
1	L-L-L	L-N-N	26.3	18.5	85.7	33.7	.0000
2	N-L-L	N-L-L	15.8	15.4	9.5	.5	.77
3	L-L-N	L-L-N	71.1	61.5	14.3	19.2	.0001
4	N-L-N	N-L-L	89.5	90.8	23.8	46.5	.0000
5	L-N-N	L-L-L	26.3	21.5	14.3	1.2	.56
6	L-L-N	L-L-L	63.2	67.7	23.8	13.0	.002
7	N-L-L	N-L-L	63.2	52.3	14.3	13.5	.001
8	N-N-N	N-L-N	26.3	13.8	38.1	6.1	.05
9	N-L-N	N-L-L	21.1	7.7	23.8	5.2	.07
10	L-N-N	L-L-L	40.5	30.8	4.8	8.4	.01
11	N-L-L	N-N-N	34.2	23.4	66.7	13.1	.001
12	L-L-L	L-L-N	44.7	58.5	90.5	11.8	.003
13	N-N-N	N-L-N	18.4	12.3	14.3	.7	.70
14	L-L-N	L-L-L	44.7	40.0	9.5	8.1	.02
15	N-L-N	N-L-L	10.5	17.2	19.0	1.1	.59
16	L-N-N	L-L-N	5.3	9.2	19.0	3.0	.23
17	L-L-L	L-L-L	63.2	64.6	81.0	2.3	.32
Overall Leniency[b]			39.1	35.6	32.5		

[a]The two columns indicate the classifications of each student (L=LD, N=Non-LD) according to three criteria. The "Low Ach" column lists the classifications of the student according to the school, the 1.0 SD low achievement definition, and the 1.5 SD low achievement definition. The "Federal" column lists the classifications of the student according to the school, the 1.0 SD federal definition, and the 1.5 SD federal definition.

[b]F (2,121) = 1.2, p = .32.

Table 5

Average Correlations of Agreement with Group Composite

	Composite Group Decisions				
	Teachers	Sch. Psyc.	Naive	F(2,121)	p
Teachers	.49	.50	.05	36.98	.0000
School Psychologists	.47	.53	.10	31.35	.0000
Naive	.04	.08	.62	31.76	.0000

Table 6

Judges' Ratings of the Degree to Which Factors Influenced Their Decisions

Factor	Means and Ranges of Ratings[a]			
	Teachers	Sch. Psyc.	Naive	Overall
Intellectual	4.3 (3-5)	4.2 (1-5)	3.9 (3-5)	4.2 (1-5)
Academic Achievement	4.4 (3-5)	4.2 (1-5)	3.8 (3-5)	4.2 (1-5)
Child's Sex[b]	1.9 (1-5)	1.9 (1-4)	1.2 (1-2)	1.8 (1-5)
Perceptual-Motor	3.4 (1-5)	3.6 (1-5)	3.2 (1-5)	3.5 (1-5)
Adaptive Behavior	3.2 (1-5)	3.0 (1-5)	3.0 (1-5)	3.1 (1-5)
Expected-Actual Achievement Discrepancy[b]	4.4 (3-5)	4.4 (1-5)	3.4 (2-5)	4.2 (1-5)
Personality Data	2.7 (1-4)	2.8 (1-4)	3.2 (2-5)	2.9 (1-5)
Behavioral Recordings	3.2 (1-5)	3.0 (1-5)	3.1 (1-5)	3.0 (1-5)
Subtest Score Discrepancy[b]	4.1 (1-5)	3.6 (1-5)	3.0 (1-5)	3.6 (1-5)

[a]Ranges are the numbers in parentheses. Variables were rated on a scale where 1 = none, 2 = insignificant, 3 = moderate, 4 = significant, 5 = very significant.

[b]These factors were rated differentially across groups of judges: Child's Sex [$F(2,117) = 5.53$, $p < .01$]; Expected - Actual Achievement Discrepancy [$F(2,118) = 10.64$, $p < .0001$]; Subtest Score Discrepancy [$F(2,115) = 7.68$, $p < .001$].

Table 7

Average Mean Differences Between Non-LD and LD Students for Each Group of Judges[a]

Teachers	Avg. Mean Difference	School Psychologists	Avg. Mean Difference	Naive	Avg. Mean Difference
PIAT Mathematics	10.0	PIAT Mathematics	12.1	W-J Reading Aptitude	13.5
W-J Memory	6.6	W-J Mathematics Achievement	8.5	W-J Verbal Ability	13.2
W-J Mathematics Achievement	6.5	W-J Verbal Ability	7.8	WISC-R Full	13.1
PIAT Total	6.0	W-J Memory	7.7	WISC-R Performance	12.9
WISC-R Full - PIAT Total	5.5	PIAT Total	7.5	WISC-R Vocabulary	12.9
WISC-R Verbal - WISC-R Performance	5.4	W-J Knowledge Aptitude	7.4	W-J Knowledge Aptitude	12.0
W-J Verbal Ability	5.2	W-J Written Language Aptitude	7.4	PIAT Total	12.0
PIAT Information	5.2	PIAT Passage Comprehension	7.3	WISC-R Information	11.8
W-J Writ. Lang. Aptitude - W-J Writ. Lang. Achievement	5.1	W-J Writ. Lang. Aptitude - W-J Writ. Lang. Achievement	7.1	WISC-R Picture Completion	11.6
PIAT Passage Comprehension	5.1	PIAT Information	7.1	PIAT Information	11.5
W-J Written Language Aptitude	5.1	W-J Reading Aptitude	7.0	PIAT Passage Comprehension	11.2

[a]The table presents the first 11 variables for the three groups of judges, starting with the one of greatest average mean difference.

APPENDIX

TEST SCORES

Subject #	Sex	Age	WISC - R												Woodcock-Johnson Cognitive									Woodcock-Johnson Achievement				PIAT						Stanford Achievement		Perceptual Motor		Self Concept	Behavior Ratings: Peterson-Quay			
			Full Scale	Verbal	Performance	Information	Similarities	Arithmetic	Vocabulary	Comprehension	Pic Completion	Pic Arrange	Block Design	Obj Assembly	Coding	Broad Cog	Reading Apt	Math Apt	Knowledge Apt	Writ Lang Apt	Verbal Abil	Percep Speed	Memory	Reasoning	Math	Reading	Writ Language	Basic Skills	Math	Reading Recog	Pass Comprehen	Spelling	Information	Total Test	Math Calc	Math Concepts	Number	WRI	Piers-Harris	Inad-Imm	Soc Skills	Cond Prob	Para Prob
1	M	10-9	82	85	82	95	90	80	75	90	80	90	95	90	80	86	86	100	86	92	79	75	89	94	85	72	75	74	100	77	88	74	89	82	81	77	2	14	40	5	0	7	2
2	F	9-9	107	102	112	100	95	90	115	110	110	125	95	115	100	93	100	90	100	100	90	107	93	87	92	93	93	87	96	94	96	93	101	97	88	77	2	14	52	0	0	0	3
3	M	10-1	109	98	120	85	100	95	110	105	110	135	115	115	95	92	94	88	86	85	95	95	82	93	79	87	94	82	91	94	101	92	102	97	93	97	3	16	57	1	1	0	2
4	F	9-9	111	95	129	100	120	75	95	90	125	125	135	120	95	91	98	94	98	98	98	87	80	98	83	103	112	93	72	104	99	97	93	91	88	81	4	14	45	4	0	0	7
5	M	10-1	108	103	112	105	100	90	110	110	105	110	105	110	115	95	94	90	87	87	112	88	82	102	95	89	82	87	114	90	101	84	99	97	91	95	4	18	67	1	0	4	6
6	F	9-4	119	118	115	100	130	90	125	140	115	120	100	125	105	93	90	103	81	86	87	108	81	116	94	82	85	86	100	88	95	90	94	92	84	93	6	20	50	2	0	4	3
7	M	10-2	109	98	121	105	90	95	100	105	110	130	100	140	105	108	108	98	95	94	111	96	108	116	101	93	92	95	112	90	94	90	116	99	96	91	3	15	67	0	0	0	1
8	M	10-1	105	106	105	110	85	95	120	115	110	110	90	105	105	98	88	100	104	92	116	96	86	82	96	85	82	86	113	89	93	81	114	94	105	77	3	16	65	0	0	0	2
9	M	10-1	100	100	106	105	120	100	100	110	105	110	120	100	90	109	116	98	119	119	115	87	125	103	119	101	88	99	119	98	101	80	110	105	98	109	0	17	21	10	0	5	7

			WISC - R												Woodcock-Johnson Cognitive								Woodcock-Johnson Achievement				PIAT						Stanford Achievement		Perceptual Motor		Self Concept	Behavior Ratings: Peterson-Quay			
Subject #	Sex	Age	Full Scale	Verbal	Performance	Information	Similarities	Arithmetic	Vocabulary	Comprehension	Pic Completion	Pic Arrange	Block Design	Obj Assembly	Coding	Broad Cog	Reading Apt	Math Apt	Knowledge Apt	Writ Lang Apt	Verbal Abil	Percep Speed	Memory	Reasoning	Math	Reading	Writ Language	Basic Skills	Math	Reading Recog	Pass Comprehen	Spelling	Information	Total Test	Math Calc	Math Concepts	Number	WRI	Piers-Harris	Conf-Dom	Soc Relats	Conf Prob	Pers Prob
10	M	9-7	115	119	106	100	135	105	110	130	100	105	115	115	90	106	111	110	106	100	122	111	91	91	103	102	105	105	113	105	134	115	115	113	81	97	0	10	48	10	2	2	1
11	M	10-1	110	105	115	105	115	100	100	100	110	105	125	110	105	103	114	102	101	95	108	87	93	106	105	87	82	86	98	95	97	75	110	95	106	97	0	16	63	2	0	1	4
12	M	10-0	86	81	93	75	80	90	90	90	90	120	80	90	100	80	69	70	74	87	89	108	84	69	79	82	79	82	84	92	101	87	95	92	79	72	2	13	39	1	0	6	0
13	M	10-9	81	80	85	75	90	75	80	100	95	90	85	100	75	69	65	65	65	65	77	65	70	91	85	65	65	65	83	72	69	69	93	77	79	75	6	9	73	6	0	16	4
14	M	9-10	105	105	105	100	100	90	115	110	105	100	110	100	105	100	102	105	103	104	117	92	114	82	97	98	83	99	120	96	110	90	121	104	91	104	3	14	58	2	0	6	0
15	M	10-8	107	108	105	110	105	100	105	113	90	100	95	115	120	90	94	100	85	82	90	102	72	135	79	99	92	92	80	105	96	95	113	101	84	109	3	19	71	0	0	2	0
16	M	10-4	113	107	113	105	100	100	115	110	100	105	110	125	115	91	91	95	89	91	99	93	91	95	108	119	97	103	115	117	103	110	103	112	83	95	2	13	51	0	0	0	0
17	M	9-11	116	115	113	115	125	105	105	115	120	115	130	100	90	116	116	110	110	104	112	89	114	135	103	102	104	99	107	106	111	92	113	107	94	95	1	20	72	14	2	10	25
18	M	9-10	89	91	91	75	90	80	100	115	75	90	100	100	105	81	72	77	65	74	74	102	102	96	69	77	77	72	72	75	65	60	65	65	74	75	4	16	18	3	4	16	10

Tests Administered

All measures have a mean of 100 and standard deviation of 15 unless otherwise indicated.

APTITUDE MEASURES

WISC-R

- Full Scale
- Verbal Scale
- Performance Scale
- Information
- Similarities
- Arithmetic
- Vocabulary
- Comprehension
- Picture Completion
- Picture Arrangement
- Block Design
- Object Assembly
- Coding

Woodcock-Johnson Cognitive

- Broad Cognitive
- Reading Aptitude
- Math Aptitude
- Knowledge Aptitude
- Written Language & Aptitude
- Verbal Ability
- Perceptual Speed
- Memory
- Reasoning

ACHIEVEMENT MEASURES

Woodcock-Johnson Achievement

- Math
- Reading
- Written Language
- Basic Skills

Peabody Individual Achievement (PIAT)

- Math
- Reading Recognition
- Passage Comprehension
- Spelling
- Information
- Total Test

Stanford Achievement

- Math Calculation
- Math Concepts

PERCEPTUAL MOTOR (Use norms provided)

Bender Visual-Motor Gestalt Test

Developmental Test of Visual-Motor Integration (VMI)

SELF-CONCEPT (Use norms provided)

Piers-Harris

BEHAVIOR RATINGS (Use norms provided)

Peterson-Quay

- Inadequacy-Immaturity
- Socialized Delinquency
- Conduct Problem
- Personality Problem

A. BENDER: Normative Data

Age Group	N	Mean Scores	Standard Deviation	Plus/Minus S.D.
5-0 to 5-5	81	13.6	3.61	10.0 to 17.2
5-6 to 5-11	128	9.8	3.72	6.1 to 13.5
6-0 to 6-5	155	8.4	4.12	4.3 to 12.5
6-6 to 6-11	180	6.4	3.76	2.6 to 10.2
7-0 to 7-5	156	4.8	3.61	1.2 to 8.4
7-6 to 7-11	110	4.7	3.34	1.4 to 8.0
8-0 to 8-5	62	3.7	3.60	.1 to 7.3
8-6 to 8-11	60	2.5	3.03	.0 to 5.5
9-0 to 9-5	65	1.7	1.76	.0 to 3.5
9-6 to 9-11	49	1.6	1.69	.0 to 3.3
10-0 to 10-5	27	1.6	1.67	.0 to 3.3
10-6 to 10-11	31	1.5	2.10	.0 to 3.6

B. DEVELOPMENTAL TEST OF VISUAL MOTOR INTEGRATION (VMI): Normative Data

	Age Equivalents			Age Equivalents	
Score	Male	Female	Score	Male	Female
1	2-10	2-10	13	6-10	6-7
2	3-0	3-0	14	7-4	7-2
3	3-2	3-2	15	7-10	7-11
4	4-1	3-10	16	8-7	8-8
5	4-4	4-1	17	9-4	9-6
6	4-6	4-4	18	10-2	10-3
7	4-9	4-8	19	10-11	11-1
8	5-0	4-11	20	11-9	12-0
9	5-3	5-3	21	12-8	13-0
10	5-7	5-6	22	13-9	13-11
11	6-0	5-10	23	14-10	14-10
12	6-5	6-2	24	15-11	15-9

C. PIERS-HARRIS SELF-CONCEPT

There are a total of 80 items. The higher the score, the higher the self-concept. Institute Sample for LD and Non-LD (N = 99) $\bar{X}$ = 52.14, SD = 14.43

D. PETERSON-QUAY BEHAVIOR PROBLEM CHECKLIST: Means and Standard Deviations of Various Samples

		Conduct		Personality		Immaturity		Socialized Delinquency	
	N	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Public School (rated by teachers):									
K males	336	4.52	4.93	3.66	3.56	1.63	1.87	0.34	0.97
	342	3.73	4.44	3.68	3.19	1.67	1.81	0.27	0.74
K females	206	2.33	3.76	3.96	3.60	1.16	1.65	0.17	0.62
	281	1.96	3.09	3.37	3.00	1.26	1.12	0.11	0.44
1st males	309	4.05	4.36	2.80	3.11	1.50	1.69	0.23	0.66
	279	4.24	4.96	3.47	3.57	1.62	2.00	0.48	1.15
1st females	257	1.72	2.96	2.62	2.84	0.84	0.13	0.11	0.38
	276	2.18	3.34	3.20	2.91	1.21	1.71	0.20	0.62
2nd males	294	4.20	4.64	3.01	3.09	1.76	1.88	0.34	0.88
	273	4.12	4.76	2.89	3.19	1.61	1.79	0.48	1.07
	297	1.95	3.30	2.71	3.16	1.09	1.62	0.19	0.58
	276	2.00	3.33	3.30	3.26	1.02	1.54	0.21	0.71
6th male	62	2.93	3.66	2.77	3.13	1.35	1.99	___	___
6th female	41	1.44	2.45	2.76	3.30	1.02	1.63	___	___

ID # _____

Response Form

After examining the test scores for each child, indicate your decision of LD or non-LD. Then indicate how certain you are of your decision. Please use the back of this page to record any comments you have concerning the sorting task you have completed.

Subject Number	LD	Non-LD	Very Certain	Certain	Uncertain	Very Uncertain
1	___	___	___	___	___	___
2	___	___	___	___	___	___
3	___	___	___	___	___	___
4	___	___	___	___	___	___
5	___	___	___	___	___	___
6	___	___	___	___	___	___
7	___	___	___	___	___	___
8	___	___	___	___	___	___
9	___	___	___	___	___	___
10	___	___	___	___	___	___
11	___	___	___	___	___	___
12	___	___	___	___	___	___
13	___	___	___	___	___	___
14	___	___	___	___	___	___
15	___	___	___	___	___	___
16	___	___	___	___	___	___
17	___	___	___	___	___	___
18	___	___	___	___	___	___

Please rate the extent to which each of the factors listed below affected your decisions. Use the following numbers to indicate the effect of each factor.

1 = None 2 = Insignificant 3 = Moderate 4 = Significant 5 = Very Significant

___ Scores on intellectual measures
___ Scores on measures of academic achievement
___ The child's sex
___ Scores on perceptual-motor tests
___ Adaptive behavior
___ Discrepancies between expected and actual achievement
___ Personality test data
___ Behavioral recordings
___ Subtest score discrepancies
___ Other (please describe)

PUBLICATIONS

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University of Minnesota

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